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19 May 1965

[redacted]
Post Office Box 9474
Rosslyn Station
Arlington, Virginia 22209

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Subject: [redacted] Project SC-1305
Progress Report, April/May 1965

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Gentlemen,

Enclosed are four (4) copies of [redacted] Progress
Report on Project SC-1305 for the period April/May 1965.

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Very truly yours,

[redacted]
Vice President - Marketing

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RJL/de

Enc: (4) P.R. - 4 pp.

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PROGRESS REPORT
For
AUTOMATIC STEREO CORRELATOR
SC 1305

"Construction of Breadboard System of an Automatic
Stereo Correlator and Evaluation of the Performance Capabilities
of such a System."

Period Covered: April - May 1965

Date: 19 May 1965

Job No.: SC 1305

Document No.: OD-124

This is the ninth monthly progress report.

TASK OBJECTIVE

To manufacture a breadboard and to conduct sufficient tests to determine the performance capabilities inherent in a system of automatic stereo correlation as described in the 552 MSC proposal.

CURRENT STATUS OF WORK

1) The problem of excessive d-c level drift in the Fairchild AD03 difference amplifiers was solved by minor revision of the input circuitry. The long term stability was improved to considerably better than plus or minus 0.5 millivolts per week.

2) Tests were made on the "X", "Y", "Θ" and "M" axes using simple images such as holes and slits. The results were encouraging with respect to their repeatability. On simple targets, correlation errors as small as .002 inches were corrected. Some difficulty in target tracking with more than two axes servoing was attributed to lack of optimization of optical and electrical parameters.

3) Qualitative tests were then made with a simple stereo pair color photographic image. The tests revealed some minor optical difficulties which were corrected by the addition of a field lens and a change in the range of magnification of the zoomed image. Stereo correlation could be obtained in the "X" and "Y" axes individually but proved unstable together. The presumption was that the various optical changes had caused parameters to shift further from the optimum, and that because of the difficulty in adjusting slit displacements with relatively complex images it would be prudent to revert to "hole" images and to realign the "X" and "Y" axes systems before further tests with photographic images.

4) Test with hole images after readjustment were as follows:

- A) Images: hole pair 1/32 of an inch in diameter.
- B) Slit widths adjusted to approximately 10/1000 of an inch.
- C) Slit displacements were adjusted to provide approximate centering of the signals using images on an oscilloscope.
- D) The light intensities were manually adjusted so that with an image pair scanned on one side only (either right or left) and the image centered to give maximum output at the photo-multipliers, the signals into the integrators were 1.5 volts peak.
- E) After adjustment as outlined in "B", "C", and "D", the two axes of the right head were allowed to servo to their null positions and dial gages were set up to read displacement. An oscilloscope was connected to display the outputs of the "X" and "Y" channel AD03 difference amplifiers. It should be noted that the output signals are sawtooth in shape since we have avoided peak detection. The time constants of the servo motors provide a smooth response with this type of signal. The maximum and minimum voltages of the sawtooth voltages were measured for each displacement. The data obtained by manually displacing the axes were as follows:

Axis Dial Gage Reading (inches) AD03 output volts

Y	.1	-1mv to -8mv
Y	.085	-1mv to -14mv
Y	.115	+6mv to +15mv
X	.1	+0mv to +8mv
X	.085	+4mv to +18mv
X	.115	-8mv to -28mv

- F) The servo power amplifiers gains were set at maximum, and the feedback networks adjusted to give one overshoot when slewing from plus and minus .015 inch displacements. The axes returned to null position within plus or minus .001 inches each time.
- G) The equipment was left running for an hour and no drift in the null positions was observed on the dial indicators.
- H) Displacement of the images of as little as .002 inches was corrected for.

PROBLEM AREAS ENCOUNTERED

1) The malfunction of the intensity control circuit mentioned in the previous report has not been corrected in order to avoid delaying correlation tests.

2) In order not to delay correlation tests, the second pair of error detecting slits for each channel has not been adjusted. The proper adjustment of these with respect to the first pair is anticipated as being time consuming.

DOCUMENTATION OF VERBAL COMMITMENTS AND/OR AGREEMENTS

None have been made.

PROJECTED WORK FOR NEXT PERIOD

- 1) Additional quantitative tests with simple targets.
- 2) Tests with photographic images.

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PROGRESS REPORT
For
AUTOMATIC STEREO CORRELATOR
SC 1305

"Construction of Breadboard System of an Automatic
Stereo Correlator and Evaluation of the Performance Capabilities
of such a System."

Period Covered: March - April 1965
Date: 23 April 1965
Job No.: SC 1305
Document No.: OD-121

This is the eighth monthly progress report.

TASK OBJECTIVE

To manufacture a breadboard and to conduct sufficient tests to determine the performance capabilities inherent in a system of automatic stereo correlation as described in the 552 MSC proposal.

CURRENT STATUS OF WORK

- 1) Circuit changes have been made in the integrator circuits to achieve true linear integration instead of the semi peak detection previously used. Good electrical performance has been achieved in the X, Y and M (magnification) channels. The simple targets used up to now have not lent themselves to tests of the θ (angular) correction channel.
- 2) The above changes, plus a change in gear box ratios of the X and Y axis from 75:1 to 375:1, have corrected the hunting problem stated in the previous report.
- 3) The changes mentioned in "1" have reduced the sensitivity to light level changes to an acceptable amount.
- 4) Good closed loop servo performance with optical error signals has been achieved with the X, Y and M channels.

OPTOMECHANICAL

- 1) The following modifications have been made to the scanning disc:
 - a) The X and Y axis shutter slot widths have been increased to allow for greater phase displacement.

b) The defocusing lenses required for the operation of the magnification channel correction have been mounted.

c) The angular error shutter slits have been widened to allow for a greater adjustment angle between the shutter pair.

2) One of the two pairs of slits on the X, Y and M correction channels have been adjusted to provide useable error signals.

PROBLEMS AREAS ENCOUNTERED

1) The DC level drift of the Fairchild A003 difference amplifier has exceeded specifications and is excessive, especially during warm up. An inquiry is being made into causes.

2) The malfunction of the intensity control circuit mentioned in the previous report has not been corrected in order to avoid delaying correlation tests.

3) In order not to delay correlation tests, the second pair of error detecting slits for each channel has not been adjusted. The proper adjustment of these with respect to the first pair is anticipated as being time consuming.

DOCUMENTATION OF VERBAL COMMITMENTS AND/OR AGREEMENTS

None have been made.

PROJECTED WORK FOR NEXT PERIOD

- 1) Tests of the θ correction channel.
- 2) Further tests of the X, Y and M channels.
- 3) Optimization of shutter slit settings.
- 4) Tests with photographic images.